JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

The United Kingdom of Great Britain and Northern Ireland

NATIONAL REPORT PRESENTATION

For the

Second Review Meeting

15th to 24th May 2006, Vienna

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

Presented by

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HM Chief Inspector of Nuclear Installations, Health & Safety Executive

and

Dr Joe McHugh

Head of Radioactive Substances Regulation, Environment Agency

Presentation Structure

- Introduction
- Overview of Radioactive Waste and Spent Fuel Management in the UK
- Major Developments since 2003
- Questions and Comments
- Summary

The UK Report

- Prepared from inputs of Government Departments, Regulatory Bodies, and Industry
- Explains how the UK achieves and maintains a high level of safety and environmental protection in spent fuel and radioactive waste management

Scope

- ✓ Reprocessing
- X Naturally occurring radioactive material
- X Defence programme waste

Basic Policy – Safety and Environment

UK Government's basic policy is to ensure adequate statutory powers and other measures to protect people and the natural environment from harmful levels of radioactivity

Basic Policy – Safety and Environment

- Must meet LIMITS, and
- Reduce further in line with:

ALARP/BPEO/BPM

(Taking into account all relevant factors)

Radioactive Waste Management Policies

Definition of Waste

- It is the decision of the owner of any radioactive material as to whether there is any foreseen use and hence whether it is radioactive waste
- Regulatory control is the same under nuclear licensing whether or not it is declared as waste – hence the type and level of regulatory control does not depend on such decisions by the owners

Radioactive Waste Management Policies

Categorisation

- **VLLW**
  - Can be disposed of with ordinary refuse
  - <400kBq (β/γ) in 0.1m^3, <40kBq (β/γ) per item
- **LLW**
  - not exceeding 4GBq/te (α) or 12 GBq/te (β/γ)
- **ILW**
  - Greater specific activity than LLW but no need to consider self heating
- **HLW**
  - Need to consider self heating

Regulatory Bodies

- Health & Safety Executive (**HSE**) / Nuclear Installations Inspectorate (**NII**)

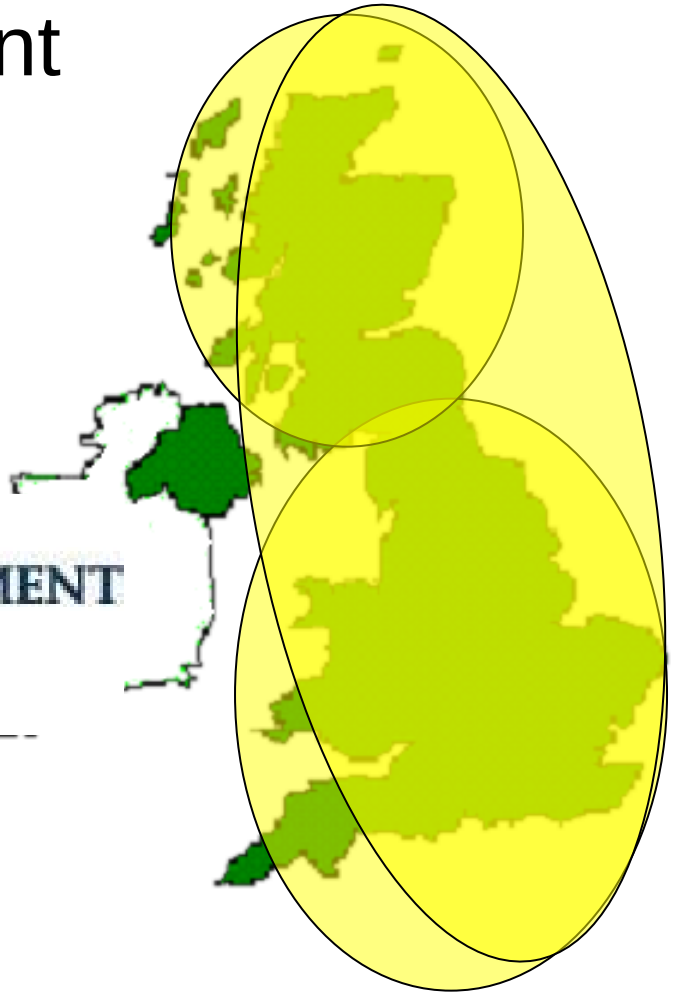
- Environment Agency (**EA**) or Scottish Environment Protection Agency (**SEPA**)

Regulatory Bodies

Environment

SEPA
Scottish Environment Protection Agency

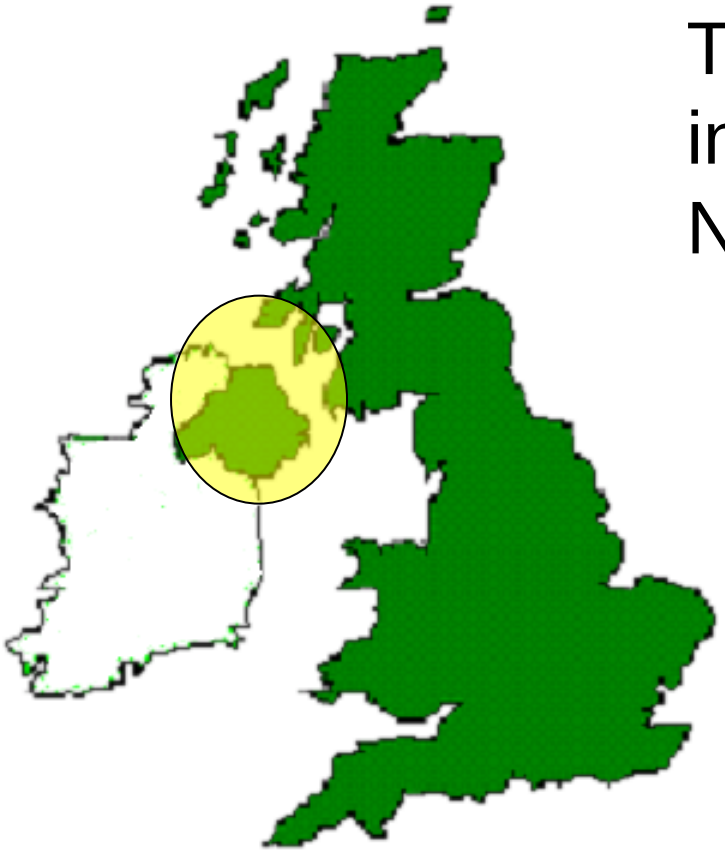
ENVIRONMENT AGENCY



Safety

HSE
Health & Safety Executive

Northern Ireland Regulatory System



There are no nuclear installations in Northern Ireland

Northern Ireland has its own regulatory system and bodies that parallel those in the rest of the UK

Regulatory System

Nature of UK Regulatory Framework

- Goal Setting
  - Minimisation of risk so far as is reasonably practicable
  - ALARP / ALARA / BPEO / BPM
- Emphasis in legislation
  - Responsibilities and competence of Operators
  - Robust arrangements
  - Early, open and transparent engagement

Regulatory System

Key Health and Safety Legislation

- Health and Safety at Work Act
  - And all implementing regulations made under it e.g. Ionising Radiation Regulations
- Nuclear Installations Act
  - Grant of Site Licence with 36 Licence Conditions

Regulatory System

Key Environmental Legislation

- Radioactive Substances Act 1993
  - Multi-media authorisation including limits and conditions
- Environment Protection Act 1990
  - e.g. waste management, contaminated land

Regulatory System

Nuclear Site Licence

HSE grant this under the Nuclear Installations Act, and can attach conditions:

- In the interests of safety
- With respect to handling, treatment and disposal of nuclear matter

Nuclear Site Licence applies to all people on the site. The site licensee is responsible for ensuring compliance

Regulatory System

Licence Conditions

Goal setting:

"Licensee must make and implement adequate arrangements"

"Adequate arrangements" can be tailored to:

- Suit business need
- Suit the stage of operation – from construction to decommissioning

Covers various aspects including radioactive waste management and decommissioning

Regulatory System

Radioactive Substances Act

- Environment Agency and
- Scottish Environment Protection Agency
- Details at:

www.environment-agency.gov.uk

www.sepa.org.uk

Regulatory System

Radioactive Substances Act

- Prior authorisation needed for the discharge and disposal of radioactive waste
- Determining an application involves appropriate consultation with stakeholders e.g. HSE, FSA, Local Authority, public
- Reviewed periodically
- Attach conditions to the authorisation

UK Facilities - SELLAFIELD

UK Facilities - SELLAFIELD

British Nuclear Group

Reprocessing

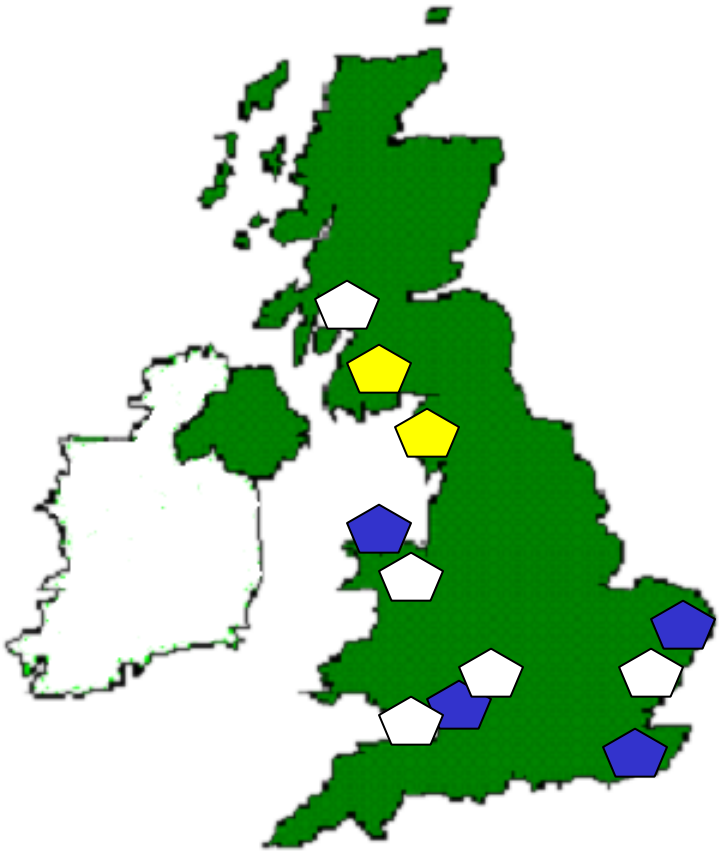
Magnox

THORP

UK Facilities - SELLAFIELD

UK Facilities MAGNOX STATIONS

UK Facilities MAGNOX STATIONS



Magnox Stations

- Hunterston A
- Chapelcross
- Calder Hall
- Wylfa
- Trawsfynydd
- Berkeley
- Oldbury
- Hinkley Point A
- Dungeness A
- Bradwell
- Sizewell A

UK Facilities MAGNOX STATIONS

Magnox Stations

DECOMMISSIONING

Shut down and all fuel removed from site.

- Hunterston A
- Trawsfynydd
- Berkeley
- Bradwell
- Hinkley Point A

UK Facilities MAGNOX STATIONS

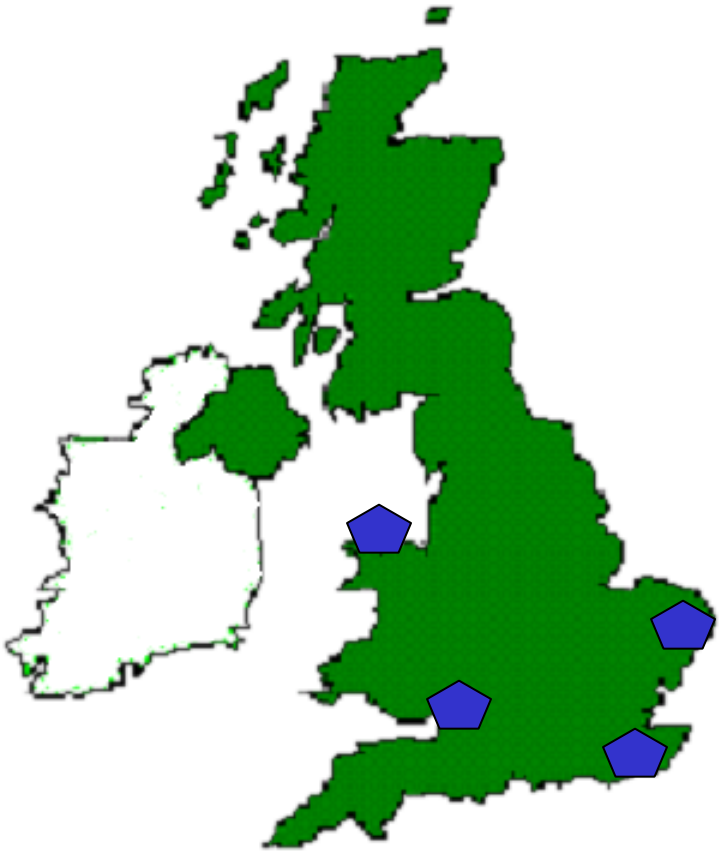
Magnox Stations

SHUT DOWN

Defuelling

- Chapelcross
- Calder Hall

UK Facilities MAGNOX STATIONS

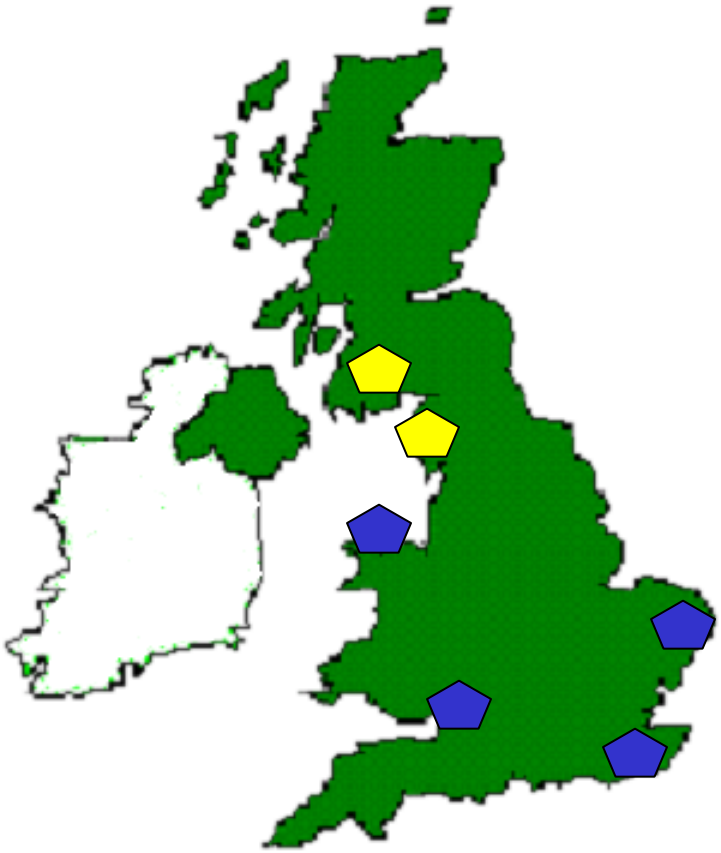


Magnox Stations

OPERATING

- Wylfa
- Oldbury
- Dungeness A
- Sizewell A

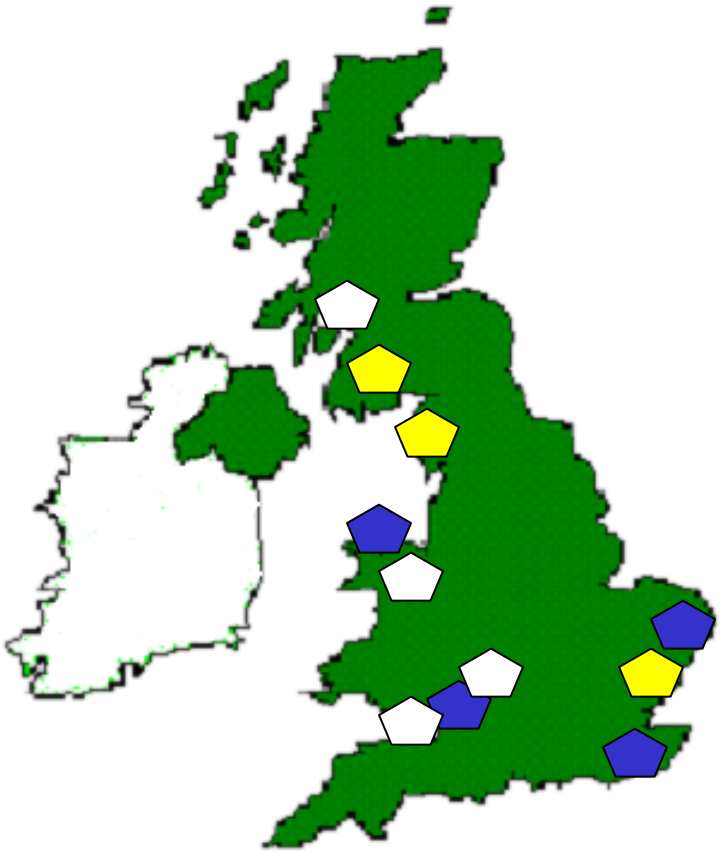
UK Facilities MAGNOX STATIONS



Spent Fuel Storage

- Wet storage for at least 90 days
- Except Wylfa dry storage

UK Facilities MAGNOX STATIONS



Radioactive Waste

Underground vaults

Above ground vaults

Reactor voids

Tanks

UK Facilities at AGR and PWR Stations

UK Facilities at AGR and PWR Stations

AGR Stations

- Torness
- Hunterston B
- Hartlepool
- Heysham I & II
- Hinkley Point B
- Dungeness B

PWR Station

- Sizewell B

UK Facilities at AGR and PWR Stations

Spent Fuel Storage

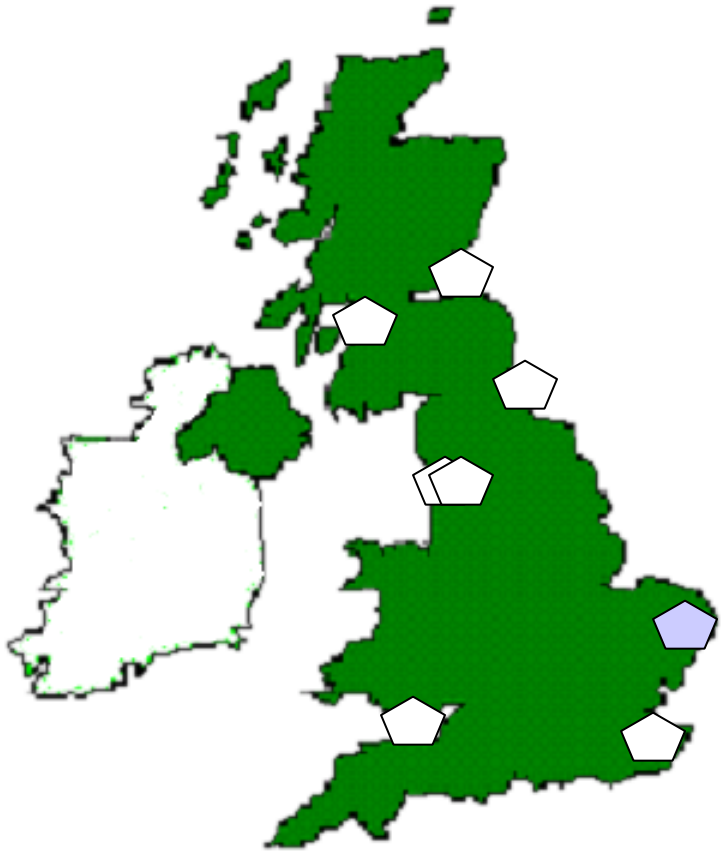
AGR Stations

- Wet storage for at least 100 days

PWR Station

- Long term storage in ponds

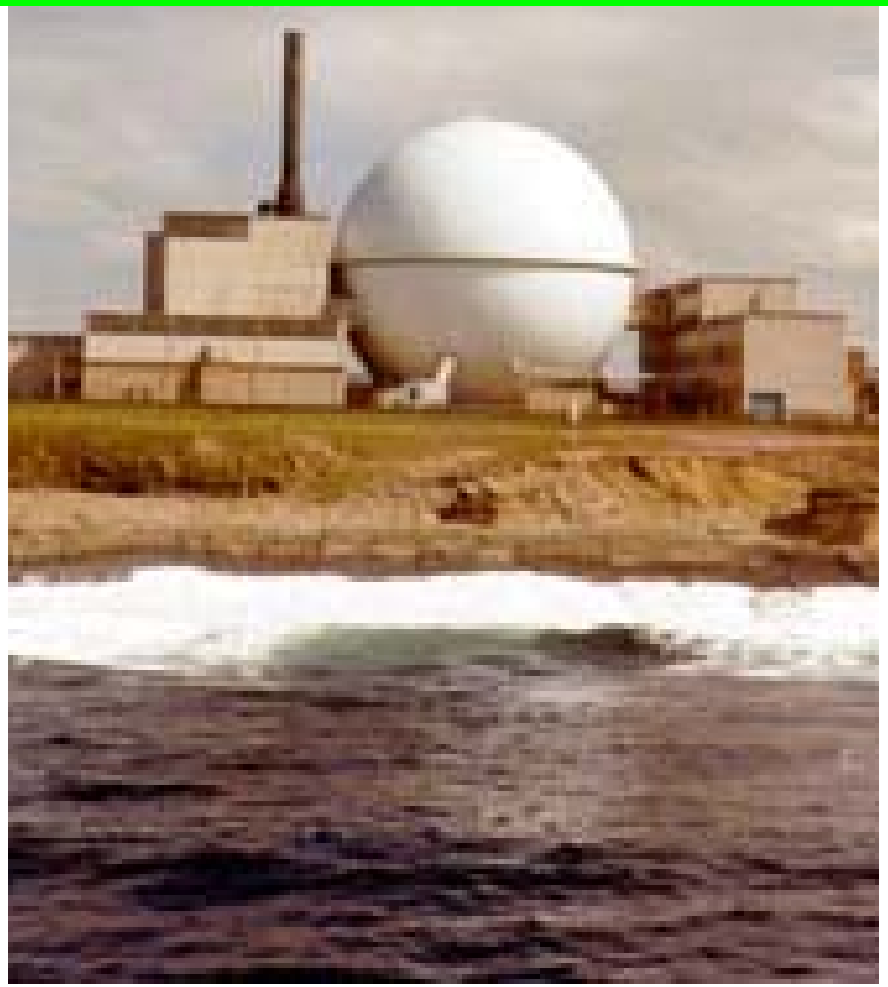
UK Facilities at AGR and PWR Stations



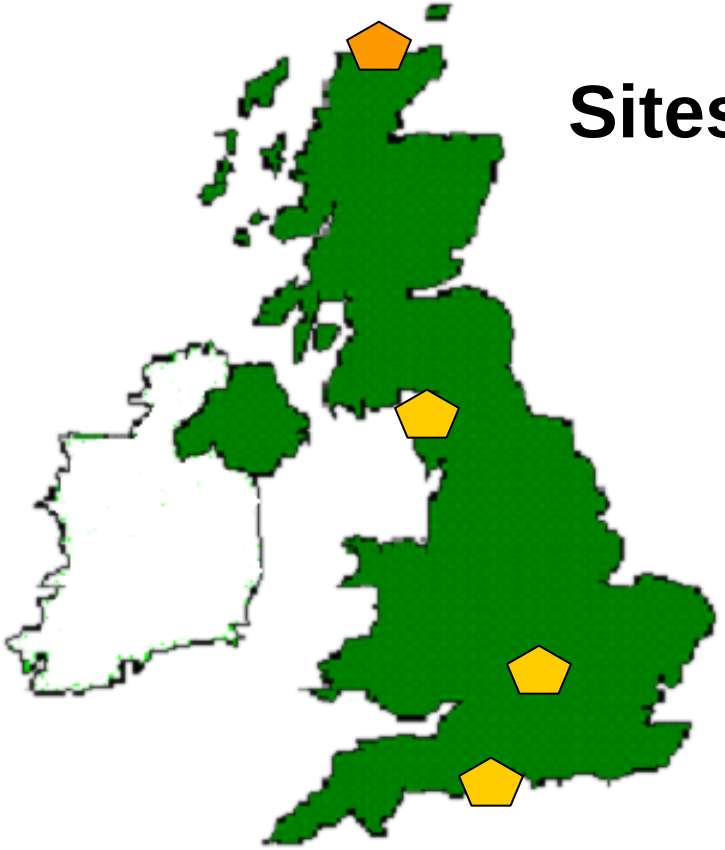
Radioactive Waste

- Voids
- Wet waste storage tanks
- Desiccant storage
- Ion exchange resin storage tanks

UK Facilities – UKAEA Sites



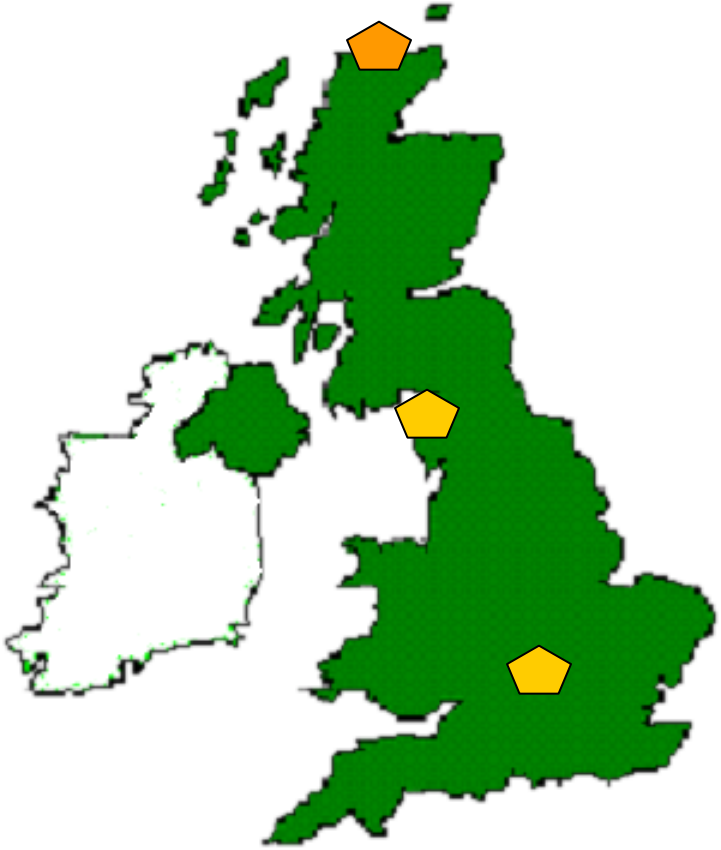
UK Facilities – UKAEA Sites



Sites being decommissioned

- Dounreay
- Windscale
- Harwell
- Winfrith

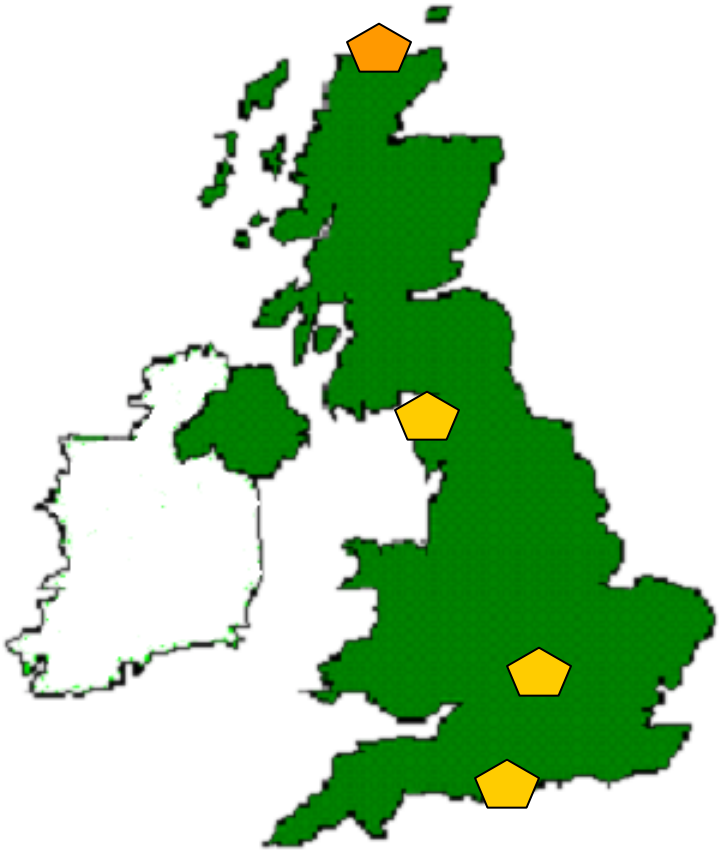
UK Facilities – UKAEA Sites



Spent Fuel Storage

- Dounreay
- Windscale
- Harwell

UK Facilities – UKAEA Sites



Radioactive Waste

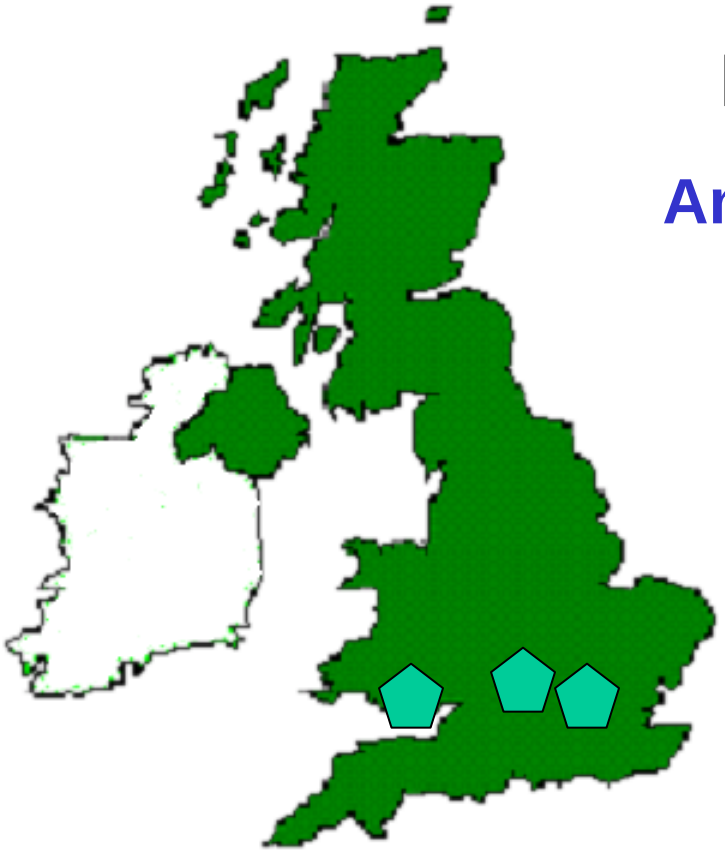
Engineered Stores

Vaults and Silos

ILW liquid waste tanks

Miscellaneous stores

UK Facilities – GE Healthcare, Amersham



Radioactive Waste

Amersham and Cardiff Sites

Decay storage in stainless steel drums

Harwell Site

“Sea dump” type drums undergoing sorting and repacking

UK Decommissioned Sites

Decommissioned sites

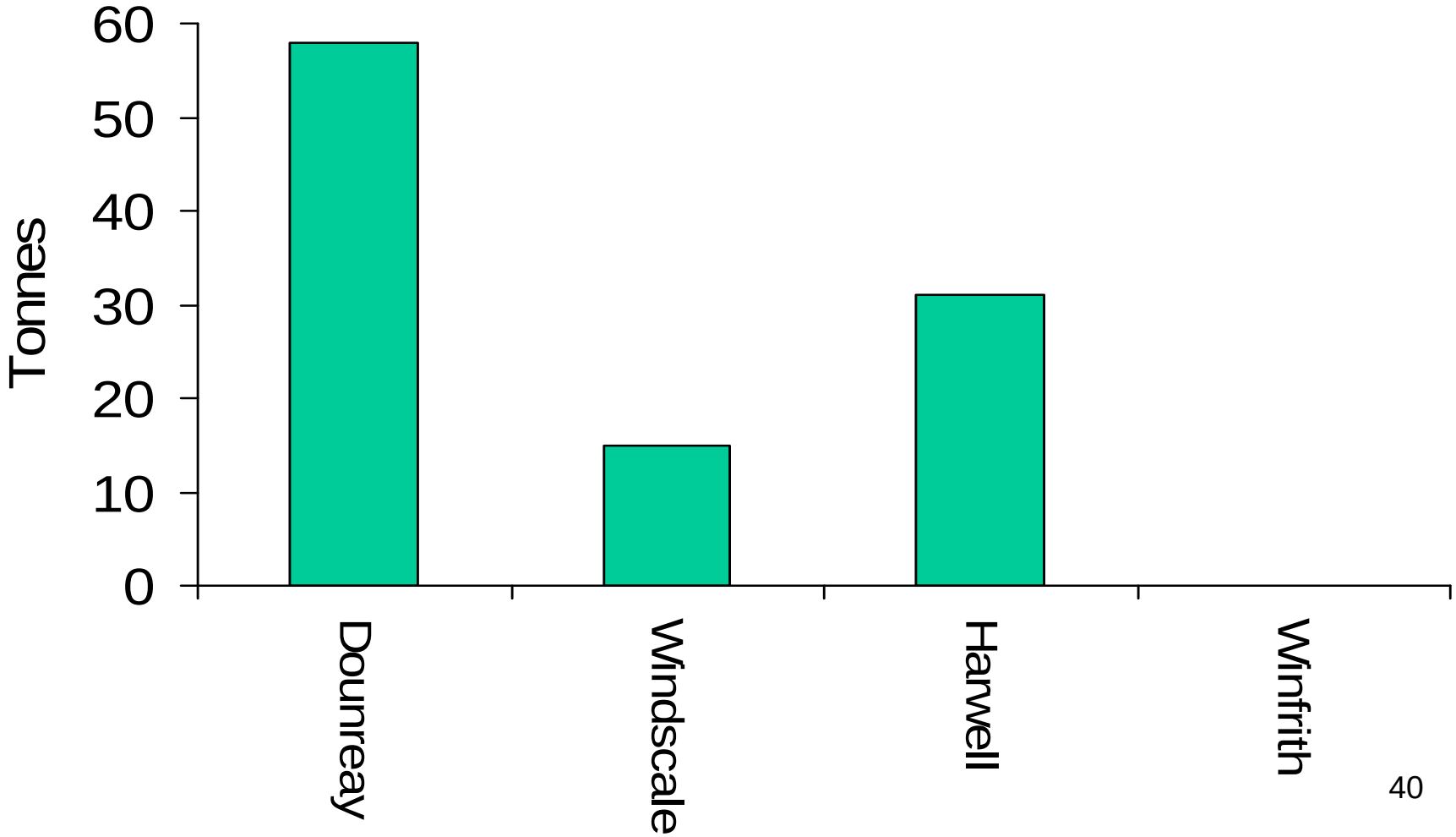
Research Reactors at:

Scottish Universities

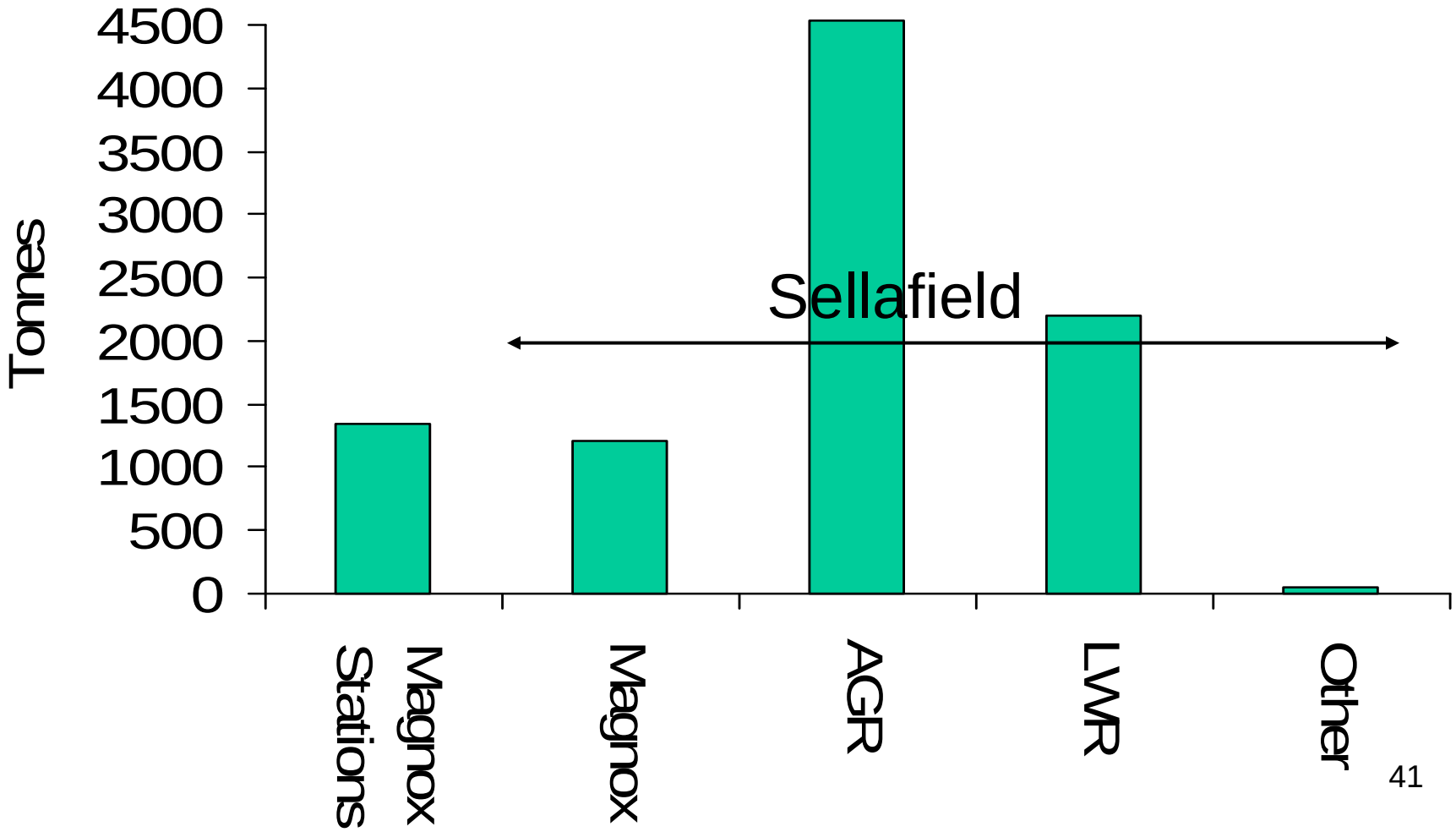
Northern Universities

ICI Billingham

Inventory of Spent Fuel



Inventory of Spent Fuel



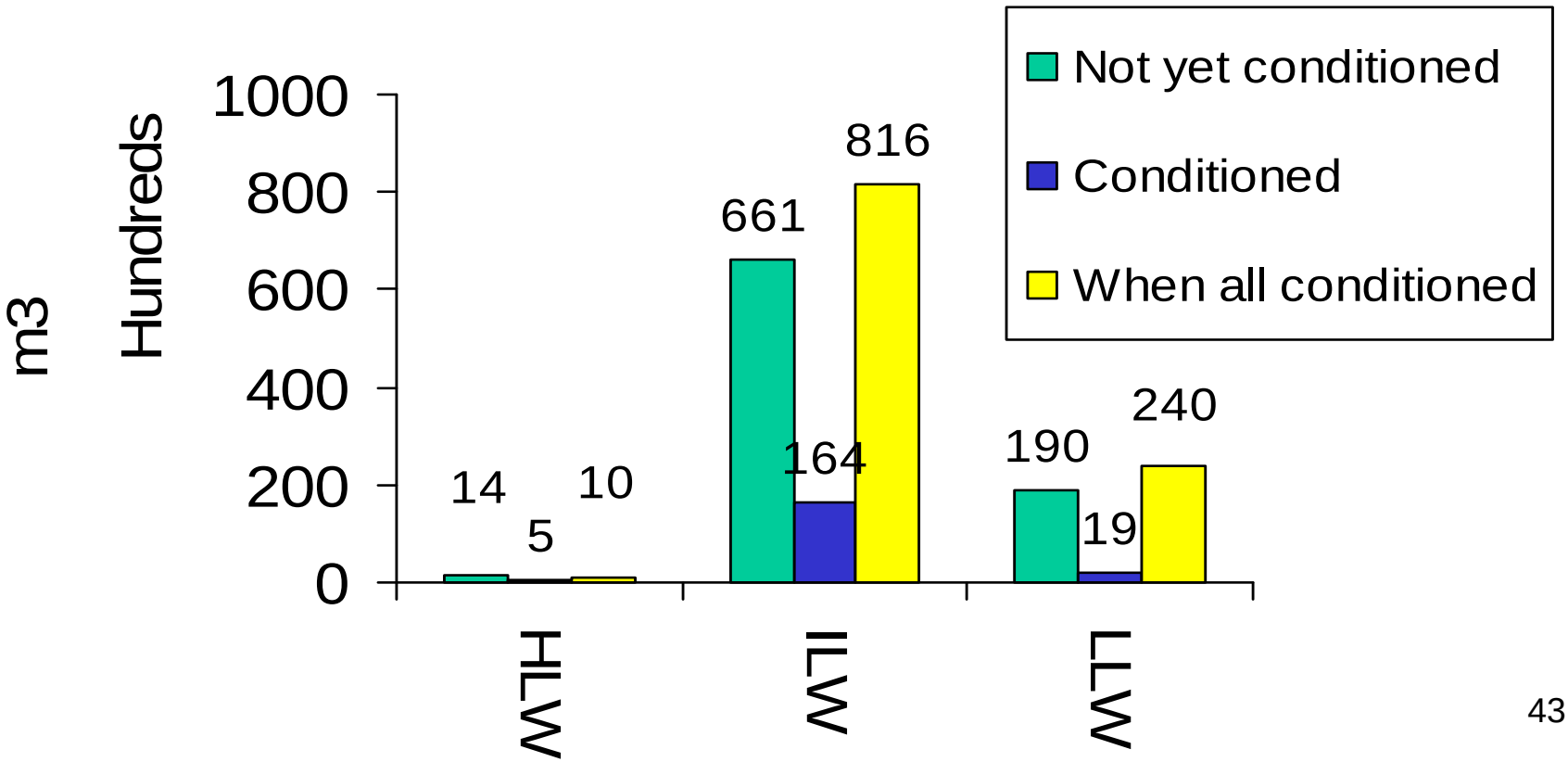
Inventory of Spent Fuel

AGRs – 2450 spent fuel elements at BE sites

PWR – all fuel discharged since going critical in 1995 held on Sizewell B site

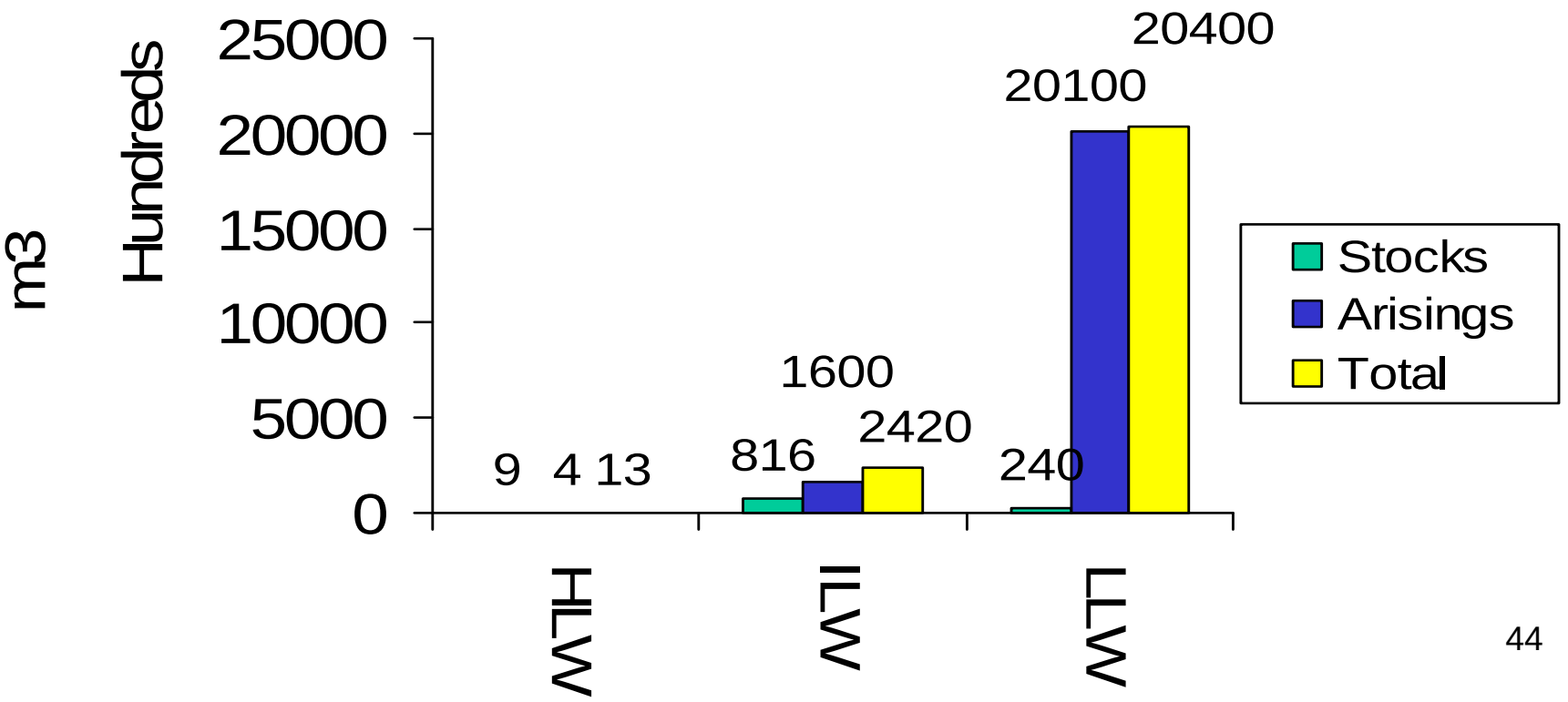
Inventory of Radioactive Waste

Radioactive waste from all sources
(2004 inventory)



Inventory of Radioactive Waste

Expected volumes of conditioned waste to end of life

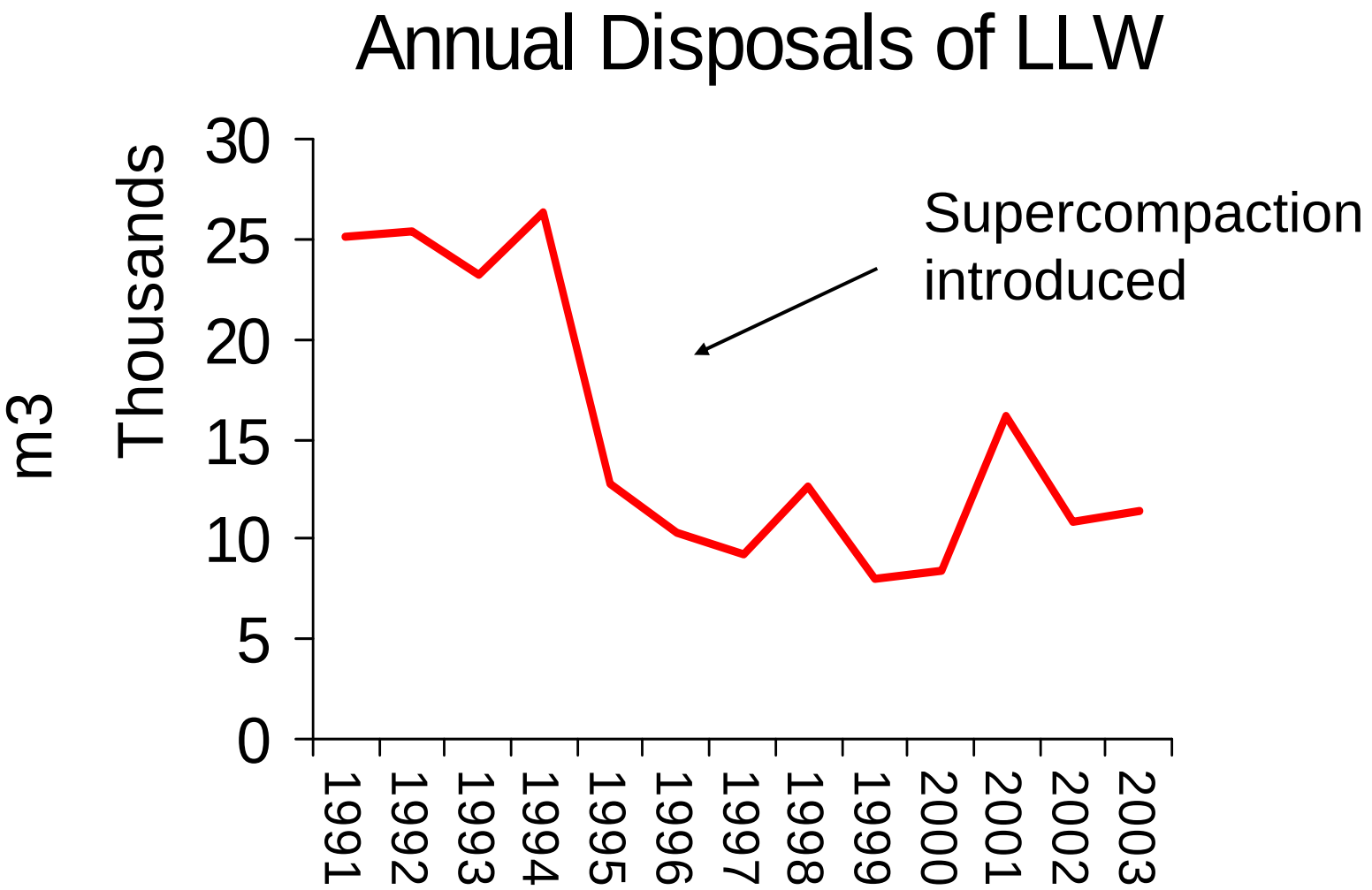


Inventory of Radioactive Waste

High Level Waste Inventory

- Net reduction of 189m^3 (12%) in liquid HLW stocks from 2001 to 2004 inventories.
- BNG Sellafield continues to meet the legal requirement set for reduction of liquid HLW stocks

Inventory of Radioactive Waste



MAJOR DEVELOPMENTS since 2003

- Nuclear Decommissioning Authority
- HSE Safety Assessment Principles
- Committee on Radioactive Waste Management
- Waste Disposal
- Nirex

Nuclear Decommissioning Authority (NDA)

– A non-departmental public body reporting to the Department of Trade and Industry

– set up in April 2005 to take

strategic responsibility for the UK's civil nuclear legacy

Nuclear Decommissioning Authority (NDA)

Core objective is to ensure that the 20 nuclear sites within its area of responsibility are decommissioned and cleaned up

- safely
- securely
- cost effectively and
- in ways that protect the environment for this and future generations

Nuclear Decommissioning Authority (NDA)

NDA role is to lead the development of a unified and coherent UK decommissioning strategy

NDA's first strategy was approved by UK Ministers on 31st March 2006

Nuclear Decommissioning Authority (NDA)

Funded by a combination of:

- direct Government funding; and
- commercial income from:
  - electricity generation
  - reprocessing and storage of spent fuel
  - the manufacture of nuclear fuel

Budget is determined by the UK Government

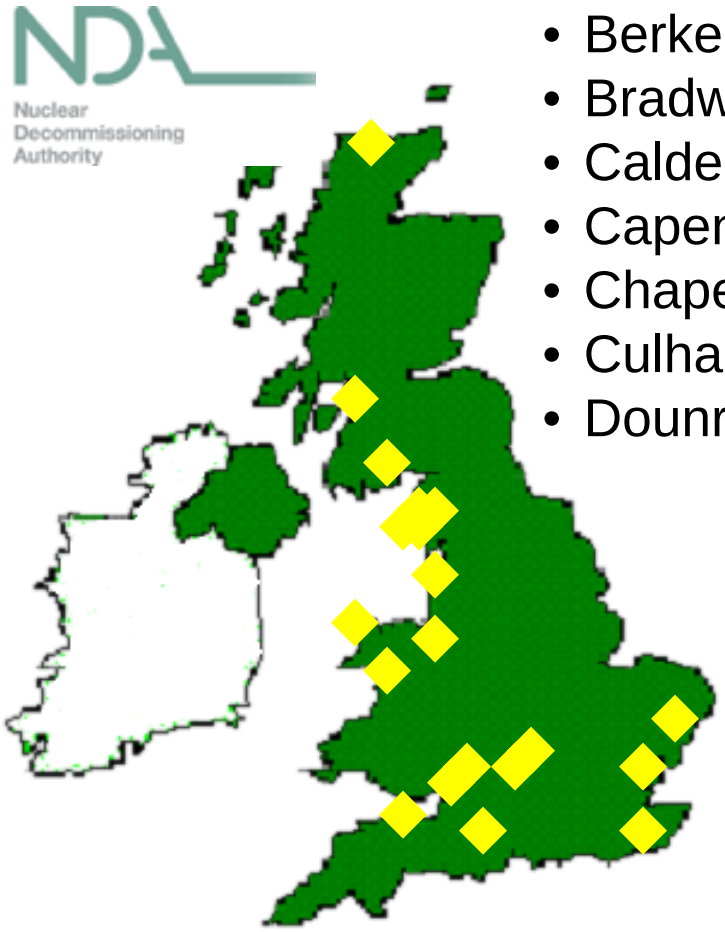
Funding determined for the current and following two years, and allocated on an annual basis

Nuclear Decommissioning Authority (NDA)

The NDA ensures its strategic responsibilities are fulfilled through contracts for the management and operation of its sites

These sites are regulated by the independent safety and environmental regulatory bodies (HSE, EA, SEPA)

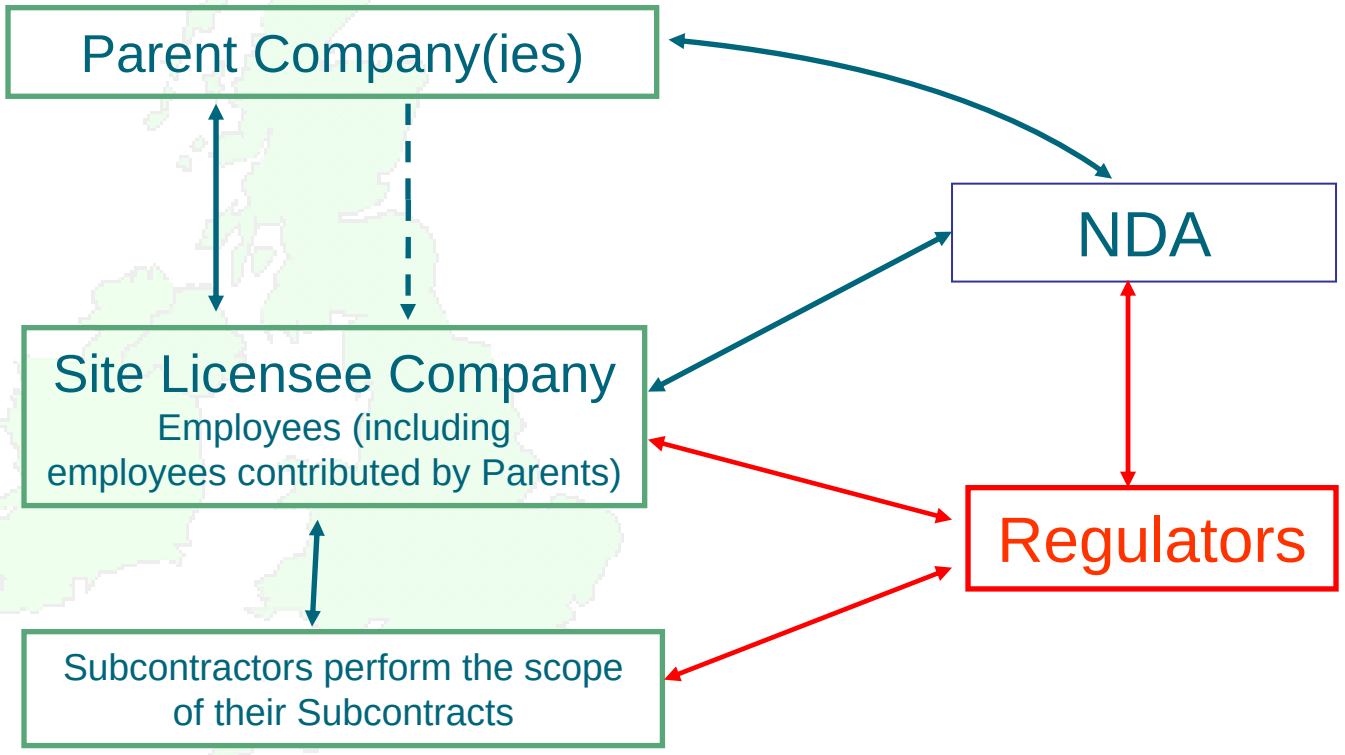
Nuclear Decommissioning Authority (NDA)



- Berkeley PS & Labs
- Bradwell
- Calder Hall
- Capenhurst
- Chapelcross
- Culham JET
- Dounreay
- Dungeness A
- Harwell
- Hinkley Point A
- Hunterston A
- Oldbury
- Sellafield
- Sizewell A
- Springfields
- Trawsfynydd
- Windscale
- Winfrith
- Wylfa
- LLW repository at Drigg

Nuclear Decommissioning Authority (NDA)

Initial Contracting Structure



Nuclear Decommissioning Authority (NDA)

Licensee has primary responsibility for safe operations

however

NDA is accountable for its own actions under general health and safety legislation and has a duty to secure safe decommissioning

Nuclear Decommissioning Authority (NDA)

The NDA has duties under the HSWA74 :

- for its employees (s2);
- for persons other than its employees(s3);

and may be liable as an organisation commissioning work by a contractor (ss36&37) and interacting with the Nuclear Site Licensee

NDA Strategy

Next 5 years

- create robust, costed and funded clean up plans
- demonstrate real progress in reducing high hazards in legacy facilities
- complete competitions for managing and operating nearly all sites
- determine a better approach to interim Intermediate Level Waste (ILW) storage and Low Level Waste (LLW) disposal
- review end states and timescales for all sites

NDA Strategy

Within 25 years

- aim to:
  - achieve final site clearance at Harwell, Winfrith, Culham, Capenhurst, Springfields
  - accelerate decommissioning at Dounreay
- aspire to:
  - accelerate the decommissioning of Magnox reactors and achieve site clearance (subject to Government approving a business case and agreeing that this represents the best way forward)

NDA Strategy

Within 75 years aim is:

- to decommission the plants and facilities at Sellafield
- to have all the wastes placed safely under long term management arrangements

NDA Strategy

Nuclear Skills

Key NDA initiatives are:

- a Nuclear Skills Institute that will carry out world class research and delivery of MSc courses
- a National Nuclear Skills Academy that will establish skills requirements nationally and deliver training local to the relevant NDA sites.

HSE Safety Assessment Principles (SAPs)

- The revised SAPs are out for comment until the end of May 2006 at
  www.hse.gov.uk/nuclear/saps
- Views on the document would be welcome

HSE Safety Assessment Principles (SAPs)

SAPs have been:

- benchmarked against the most recent IAEA Safety Standards that represent good practice
- benchmarked against WENRA harmonisation work
- expanded to better address the increased pace of remediation and decommissioning activities
- updated to be consistent with HSE's thinking on societal risk

HSE Safety Assessment Principles (SAPs)

- No fundamental shift in the numerical targets
- Some changes in detail
- Targets are to assist HSE's assessors in making judgements

Dr J O McHugh

Head of Radioactive Substances Regulation,

Environment Agency

Committee on Radioactive Waste Management (CoRWM)

An independent committee appointed by the UK Government and the devolved administrations for Scotland, Wales and Northern Ireland.

- to recommend the best option for long-term management of higher-activity radioactive wastes
- to do this in an open, transparent and inclusive way
- to deliver its recommendations by July 2006

Future decisions and policies will be made by UK Government and devolved administrations

Committee on Radioactive Waste Management (CoRWM)

CoRWM began its work in November 2003 and has carried it out in three broad phases:

- Phase 1: programme planning and early analysis
- Phase 2: finalising assessment methodology (inventory, assessment criteria and shortlist of options for detailed assessment)
- Phase 3: detailed assessment of shortlisted options and reporting

Committee on Radioactive Waste Management (CoRWM)

The options that CoRWM carried forward for detailed assessment were:

- long term interim storage
- geological disposal
- phased geological disposal (with a period of retrievability built in)
- near surface disposal of decommissioning wastes (which are relatively short lived)

Committee on Radioactive Waste Management (CoRWM)

CoRWM published its draft recommendations on 27 April 2006 (see www.corwm.org.uk) :

- geological disposal the best available approach
- coupled with a safe and secure interim storage programme
- siting of facilities based on early community involvement

Final round of public and stakeholder consultation prior to final recommendation July 2006

Committee on Radioactive Waste Management (CoRWM)

Expert inputs to CoRWM's work have included:

- expert panels convened to support CoRWM's option assessment work
- engagement with national scientific institutions e.g. the Royal Society and the Geological Society
- peer review and quality assurance groups
- review and advice from a Government panel of experts

Committee on Radioactive Waste Management (CoRWM)

CoRWM's public and stakeholder engagement has involved:

- citizens' panels and stakeholder panels
- citizen and stakeholder round tables
- CoRWM's Young People's Programme
- a National Stakeholder Forum
- written and website consultations
- a discussion guide for social networks/websites
- implementation specialist workshops

Committee on Radioactive Waste Management (CoRWM)

Next steps:

- draft recommendations have been welcomed
- Ministers await delivery of CoRWM's final recommendations in July 2006
- UK Government and devolved administrations will then decide future policy and its delivery in the light of CoRWM's final recommendations
- announcement of the way forward will be made in due course

Waste Disposal

Very Low Level Wastes (VLLW)

- UK practice is to send it to landfill sites or for incineration
- new landfill sites need approval by the planning authority
- operation is subject to licensing by the environmental regulator

- Landfill disposal of VLLW or incineration is currently used mainly by hospitals, universities, etc.

Waste Disposal

VLLW

- The UK has commissioned a fresh review that is due to report later this year (2006)
  - will update earlier assessments
  - extend them to provide further assurances about VLLW disposals from the few nuclear sites using this disposal route

Waste Disposal

LLW

- LLW management discussed at two national stakeholder workshops in 2005
- Publication of a Government consultation document on 28 February 2006
  - including a statement of proposed future policy
- LLW management policy statement will be finalised in light of the consultation, due to close at the end of May 2006

Low Level Waste Repository at Drigg

Waste Disposal

Low Level Waste Repository at Drigg (LLWR)

- The Environment Agency (EA) has reviewed the Post-closure Safety Case for the LLWR
- Taking into account the possible effects of coastal erosion in the future, the EA has amended the conditions of the authorisation regarding solid waste disposal on the site

Waste Disposal

Amended authorisation for LLWR at Drigg

- Disposal in the current disposal area can continue
- EA will not authorise a new vault until BNGSL can show that the potential future impacts from coastal erosion are minimised
- EA will then review the remaining capacity of the LLWR, and publish its findings
- Details on EA website at
  www.environment-agency.gov.uk

Nirex

Originally set up in 1982 by the nuclear industry to provide it with waste disposal services

Nirex's programme for developing a deep repository was abandoned in 1997

The company continues to

- provide advice on standards for the conditioning and packaging of radioactive waste
- compile the UK Radioactive Waste Inventory
- serve as the main UK source of knowledge on underground disposal of waste

Nirex

To ensure Nirex advice is independent of the nuclear industry, the company was taken into joint Defra/DTI ownership from 1 April 2005

A jointly owned shareholding company has been established for this purpose

The long-term future of Nirex will be decided in light of CoRWM's recommendations and policy decisions taken by Government in light of them

ANSWERS TO QUESTIONS RECEIVED

Contaminated Land

Remediation of Contaminated Land

- Regulations are being drafted
- Number of affected sites is uncertain – but will initially not apply to licensed nuclear sites
- The person who caused the contamination will be responsible for remediation
  - if they cannot be found the owner or occupier of the land will be responsible
- The relevant environment agency will regulate remediation

Discharges

Progressive reduction of discharges

- Discharges to sea and atmosphere have been declining as a result of a range of improvements including:
  - minimisation of the creation of radioactive waste
  - developments in abatement technology (eg Tc99)
  - closures of old plant (e.g. Magnox power station closure programme)

Spent Sources

Orphan Spent Sources

- New regulations (2005) require:

  "*The appropriate Agency shall be prepared or have made provision, including assignment of responsibilities, to recover any orphan source and shall have drawn up appropriate response plans and measures*"

- Government funding for recovery and disposal of orphan and disused sources

Spent Sources

Responsibility for spent sources

The holder is responsible for any source until

- it is returned to the supplier or manufacturer
- transferred to another holder
- placed in a recognised installation

The Government has issued draft guidance on acceptable ways in which holders can make financial provision for disused sources

http://www.defra.gov.uk/corporate/consult/hass-regs-directions/hass-eaguidance.pdf

Spent Sources

Disposal of Spent Sealed Sources

- Recycling is encouraged where possible
- Those meeting the LLW criteria can normally be disposed of to the Low Level Waste Repository at Drigg
- Higher activity sources are currently placed in storage at Sellafield and will be managed in future as Intermediate Level Waste
- The future long-term management of sources will be considered as part of the ongoing policy reviews

Spent Sources

Programme Cyclamen

- Project to implement both fixed and mobile radiation detection systems at UK points of entry
- The ‘Cyclamen’ capability will screen all traffic types, including
    - Containers
    - Airfreight
    - Vehicles
    - Passengers
    - Baggage and parcels
- Some such systems are already operational at a number of UK ports and airports
- HM Revenue & Customs responsible for operation

Substitution

Return of waste to overseas customers

- ILW substitution covers the UK long-term management of ILW from re-processed overseas spent nuclear fuel and the return of an additional, equivalent, amount of HLW
- Returns of HLW from overseas reprocessing contracts are scheduled to commence in 2008

Dr M W Weightman

HM Chief Inspector of Nuclear Installations,

Health and Safety Executive

Safety Assessment

Periodic Safety Reviews

- The requirement to undertake periodic reviews of safety cases applies to all facilities on a licensed site including radioactive waste management facilities
- Periodic Safety Reviews (PSR) are currently undertaken on a 10 year cycle
- Expectations for these reviews are explained in the document T/AST/050 www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/tast050.pdf

Safety Assessment

Aspects of a Periodic Review

- identify and address ageing processes that may limit the safe life of any items
- review changes in relevant safety standards, analytical methodologies,inspection techniques etc and apply them as appropriate
- validate relevant plant and process information and documentation
- review operating experience

Decommissioning

Distinction between operation and decommissioning

- A single licence covers the facility from the start of construction through to the end of decommissioning
- From the viewpoint of licensing, there is no distinction between the different stages of the life of an installation
- However different safety case / operating constraints / management arrangements

Decommissioning

Decommissioning in Design

Account should be taken of the need for decommissioning. This should include:

- methods to prevent the spread of contamination
- control of activation
- design features to facilitate clean out and decommissioning
- design features to reduce dose uptake by decommissioning workers

Decommissioning

Decommissioning on non-licensed sites

Safety is ensured through the same regulatory and management processes as during the operational phase. e.g.

- Special risk assessment is required under the Ionising Radiations Regulations 1999
- If new disposal routes are required e.g. for contaminated building rubble, then application must be made for a variation to disposal authorisation

Regulators

Interface between EA/SEPA and HSE

- Codified in Memoranda of Understanding (MoUs). Website references in report
- Objectives of the MoUs are to ensure that:
  - activities of the regulators are consistent, coordinated and comprehensive
  - the possibility of conflicting requirements being placed on licensees is avoided
  - synergies are exploited
  - duplication of activity is minimised

Regulators

Radiation Protection Regulators

- HSE in Great Britain and
- HSE (NI) in Northern Ireland

- Separate (but almost identical) legislation
- Annual liaison committee between these two bodies and the three environment agencies
  - the Environment Agency
  - Scottish Environment Protection Agency
  - Environment and Heritage Service for Northern Ireland)

Records

Requirements to maintain records

- Obligations under licence:
  - LC6 Documents records authorities
  - LC25 Operational records
  - LC35 Decommissioning
- Expectations described in document T/AST/024 “Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites”, on the HSE’s website www.hse.gov.uk

Summary

The UK has made, and will continue to make, progress on many of the issues highlighted in the first review meeting:

notably

Summary

Policies and practices (Article 32)

- The UK is nearing completion of the initial stage of reviewing policy on the long-term management of radioactive waste, with the independent Committee (CoRWM) due to report in July 2006.
- This was an open, transparent and inclusive process that the UK will take forward in further policy development

Summary

Policies and practices (Article 32)

- The UK, through the NDA, now has a national strategy for decommissioning approved by Government.

Summary

Articles 21-24 (General Safety Provisions)

Nuclear Skills

The UK is looking to establish

- a Nuclear Skills Institute that will carry out research and delivery of MSc courses
- a National Nuclear Skills Academy that will establish skills requirements nationally and deliver local training

Summary

Safety of decommissioning (Article 26)

- The creation of a the NDA with a specific remit to deliver and finance the decommissioning of facilities operated by BNFL and UKAEA, was completed in 2005.
- NDA is looking to accelerate decommissioning where this is appropriate
- NDA provides a UK wide strategic focus for decommissioning

Summary

Disused sealed sources (Article 28)

- Government funding for recovery and disposal of orphan and disused sources

- Programme established for the safe reuse and disposal of disused sources

Summary

Progress in Decommissioning

Successful progress in:

- safe shutdown, defuelling and decommissioning of Magnox Power Reactor fleet.
- decommissioning of UKAEA and other research sites.
- decommissioning legacy plant at Sellafield

Summary

Progress in Radioactive Waste Management

Successful progress in:

- putting Medium Active Concentrate into a passive state while meeting targets for Tc99 discharges ahead of schedule.
- reducing liquid HLW stocks through vitrification.
- repackaging PCM to modern standards
- treating active sodium from PFR

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

The United Kingdom of Great Britain and Northern Ireland

NATIONAL REPORT PRESENTATION

For the

Second Review Meeting

15th to 24th May 2006, Vienna